

Doctor of Philosophy Degree Program

Program Description

The Doctor of Philosophy degree program in Pharmaceutical Sciences uses an interdisciplinary approach to prepare students for careers in teaching and research in academic institutions, and for employment in industry, government and other agencies and institutions involved in health-science oriented research and development. The program of study may be individualized according to the academic background and area of research interest of the student, and includes: required and elective course work, participation in departmental activities such as seminars and teaching assignments, and in-depth research involving a topic of interest to the student and major professor.

Program Objectives

The objectives of the program are that students will be able to:

- demonstrate a comprehensive knowledge of the core areas of the pharmaceutical sciences.
- successfully conduct all aspects of research in the pharmaceutical sciences.
- demonstrate knowledge of research methodology in their selected field of the pharmaceutical sciences.
- demonstrate knowledge of scientific advances in their selected field of the pharmaceutical sciences.
- identify problems in the pharmaceutical sciences and formulate appropriate solutions to these problems.
- communicate effectively in both written and oral forms.
- appropriately gather and analyze data using various information technologies.
- understand the importance of continuing professional development, self-improvement, and life-long learning.
- adhere to professional and ethical responsibilities.

Graduate Program

Admission Requirements

Minimum expectations for consideration for admission into the Ph.D. program include the following:

1. a Bachelor of Science in Pharmacy, Chemistry, Biology or an equivalent degree in a related area, or a Pharm D degree;
2. a minimum GPA of 3.0* based on a 4.0 scale;
3. a minimum GRE score of 1000 (composite of verbal and quantitative sections);

4. for an applicant from a country where the primary language is other than English, a minimum TOEFL score of 550 or 213 on the computer-based test.

* Acceptance into the graduate program in Pharmaceutical Sciences is based on the overall record and ability of the applicant. Applicants failing to meet the required minimum GPA or the required minimum GRE may be considered for admission provided their record is indicative of exceptional ability.

Application for admission must be made on forms that may be obtained from the Department of Pharmaceutical Sciences or the department web page. An application cannot be given final consideration until all required components have been received. A complete application consists of the following:

1. A nonrefundable \$25 application fee, the application form and additional information requested on the application form.
2. Official transcripts. An official transcript is one that has been issued by an institution and received by the department in an envelope sealed by the issuing institution. The transcript will contain the official school seal or stamp and the signature of the registrar. You are required to submit one separate official transcript from each college or university you have previously attended or are currently attending. Faxed documents are not accepted as official.
3. Official report of GRE scores. Please use institution code 5623.
4. Official report of TOEFL scores, if required. Please use institution code 5623.
5. Recommendations on the supplied forms from three persons who are able to judge the applicant's accomplishments and academic ability. Recommendation forms should be sent directly to the Ph.D. Program Director.

For more information, contact the Director of the Ph.D. Program, Department of Pharmaceutical Sciences, Mercer University, College of Pharmacy and Health Sciences, 3001 Mercer University Drive, Atlanta, GA 30341-4155, or telephone (678) 547-6237.

Special Student Classification

Certain individuals may apply as special students in the Ph.D. program. This classification allows students to enroll upon submission of an application and official transcripts and approval of the program director.

Applicants must have completed a minimum of a bachelor's degree from an accredited college and must possess appropriate credentials for admission to the graduate program with the exclusion of the GRE. Special student classification does not assure admission to the graduate program, and these students must reapply for admission to the graduate program and satisfy all admission requirements to be considered. A special student may apply a maximum of nine credit hours as transfer credit toward the Ph.D. degree if the program of study can be completed within the stated time in residence. Special students must submit applications no later than thirty days before the beginning of the semester in which special student classification is sought.

Financial Support

Financial support for graduate students in the department is available through teaching assistantships and tuition waivers. Stipends will be provided on a competitive basis for participation in undergraduate laboratories and other Departmental activities. Additional financial aid may be available through grants and/or contracts as well as guaranteed student loans.

Course Requirements

The Doctor of Philosophy Degree is awarded to students of exceptional scholarly achievement who demonstrate the ability to conduct original research. A minimum of 70 semester hours including 35 hours of dissertation research is required for graduation. Requirements for the degree, however, are not determined solely in terms of a fixed number of courses, credits and years of residence. Graduate programs are highly individualized and are tailored to the characteristics and interests of the individual student.

Students entering the Ph.D. program in the Pharmaceutical Sciences are expected to have a background that includes the following minimum prerequisites: integral and differential calculus, statistics, expertise in at least one computer programming language, one year of biochemistry, and one semester of mammalian physiology.

The program of study will be determined by the major professor in consultation with the student and the Student Advisory Committee (SAC).

Courses in addition to those in the core will be selected to develop strengths in the student's areas of interest and research. These courses may be chosen from those offered by the College of Pharmacy and Health Sciences faculty or may be completed at another university through cross registration via the Atlanta Regional Consortium for Higher Education. Any course deemed appropriate by the SAC may be included on the Program of Study. Non-pharmacy courses are most commonly selected from disciplines such as chemistry, engineering, mathematics, physiology, statistics, or related areas. In some instances the SAC may determine that certain undergraduate pharmacy courses are essential components of the program of study. No graduate credit will be given for such courses.

The core curriculum for the Ph.D. degree, as well as elective courses taught within the department, are listed below:

Core Curriculum

PHA 801. Introduction to the Pharmaceutical Sciences	(3 hours)
PHA 803. Research Techniques I	(3 hours)
PHA 804. Research Techniques II	(3 hours)
PHA 805. Isotope Techniques	(3 hours)
PHA 807. Pharmaceutical Biotechnology	(3 hours)
PHA 808. Quantitative Aspects of Drug Action I	(3 hours)
PHA 809. Quantitative Aspects of Drug Action II	(3 hours)
PHA 897. Graduate Seminar	(3 hours)

Current Department Courses

PHA 813. Advanced Medicinal Chemistry	(3 hours)
PHA 833. Advanced Pharmacokinetics	(3 hours)
PHA 835. Advanced Physical Pharmacy I	(3 hours)
PHA 836. Advanced Physical Pharmacy II	(3 hours)
PHA 837. Advanced Biopharmaceutics	(3 hours)
PHA 839. Drug Delivery Systems	(3 hours)
PHA 849. Special Topics in Pharmaceutics	(1-5 hours)
PHA 869. Special Topics in Pharmacodynamics	(1-5 hours)

Transfer Credit

Upon approval by the program director, up to 15 semester hours of graduate-level credit may be transferred from other approved institutions. The student must supply a transcript and the necessary descriptive materials from each course to the program director. The program director will determine the equivalent course and the number of credit hours accepted. Courses cannot be transferred for credit if: a) they have been applied in whole or in part toward another degree; b) they have been taken more than six years before admission into the Ph.D. program; or c) a grade below B (or the equivalent) was earned.

Seminar Requirements

Throughout the course of study the student is expected to read the current literature and attend and actively participate in the seminar programs offered by the department and the College of Pharmacy and Health Sciences. The student will register for seminar during the summer semester of each year.

Graduate Student Teaching Program (GSTP)

Each student in the Ph.D. program is required to complete the GSTP. The goal of the program is to introduce graduate students in the department to the necessary skills should they decide to pursue a career in academics. These skills include, writing, presentation, curriculum development and teaching.

Student Probation and/or Dismissal

A cumulative grade point of at least 3.0 is required for graduation from the Ph.D. program. Semester and cumulative grade point averages are indications of a student's academic performance. A student whose grade point average for a single semester drops below 3.0 or whose cumulative grade point average falls below 3.0 or who does not provide regular, documented evidence of progress in their research program is making unsatisfactory academic progress.

1. Academic Warning—An academic warning is issued the first time that a student's single semester and/or cumulative GPA falls below 3.0 or the first time a student receives a grade of less than B or S in any graduate-level course, or in an undergraduate course offered by the Department of Pharmaceutical Sciences.
2. Academic Exclusion—Students may be permanently excluded from the program for:

1. failing to maintain a cumulative GPA of 3.0 following a previous academic warning.
2. receiving a grade lower than B in more than two graduate-level courses or in two undergraduate courses taught within the Department of Pharmaceutical Sciences.
3. two unsatisfactory performances on the Ph.D. preliminary examination.

Residence Requirements

Graduate students must complete all degree requirements within six years of the initial date of matriculation. Two years must be completed in residence at Mercer University. A student must be in residence at the time of completion of the dissertation.

Student Advisory Committee (SAC)

This committee shall consist of five voting members. At least three committee members must be Mercer University graduate faculty members, and at least one must be from outside of the department. In addition to the major professor, at least one of the Mercer graduate faculty members must be from within the student's discipline. Two or more committee members must be graduate fellows of the Mercer University graduate faculty.

Because of special knowledge and distinction in the area of the student's work, additional individuals from outside the University may be appointed to the SAC with nonvoting status. To appoint an individual outside of the University to a SAC, the major professor will submit a request with justification to the program director for approval. Appeals may be made to the graduate faculty of the Southern School of Pharmacy.

The major responsibilities of the SAC are: to suggest and review courses in the program of study; to monitor the progress of the student through semiannual meetings in December and June, or more frequently if required; to solicit questions, develop the scope and format, and grade the preliminary examination; to approve the preliminary research protocol; to provide advice during the conduct of the research; and to critically evaluate and approve the dissertation and final oral defense.

Preliminary Examination

The purpose of the preliminary examination is to determine whether the student has been adequately prepared through course work and other activities to undertake an original research project. The breadth and depth of knowledge in the student's chosen discipline will also be examined. This examination will be timed and closed-book, and it will be related to the student's selected discipline and course work.

The examination will be administered after completion of all course work and other requirements listed on the Program of Study form. Approval for the student to undertake this examination must be granted by the program director at the recommendation of the major professor.

The examination will be composed of questions solicited by the SAC.

Preliminary Research Protocol

A protocol describing the student's dissertation project must be submitted to the SAC written in the format of an NIH grant proposal. The student will defend the proposal orally before the SAC. Approval of the protocol by the SAC is required before the student can proceed formally with research activities.

Admission to Candidacy

A student must apply for admission to candidacy following the successful completion of both the preliminary examination and the preliminary research protocol. The student must receive admission to candidacy at least 2 semesters prior to the date of expected graduation.

Progress Reports

Progress reports will be prepared by each student in conjunction with the major professor and submitted to the program director and the graduate coordinator by June 30 of each year.

Manuscript Requirements

All candidates for the Ph.D. degree must demonstrate competence in scientific writing by preparing and submitting at least one manuscript for publication.

The manuscript must be submitted for publication before the candidate's final oral defense can be scheduled.

Dissertation and Final Oral Defense

An essential component of the Ph.D. degree program is the student's successful completion of an original research project under the supervision of the major professor and in consultation with the SAC. The work is expected to lead to one or more publications in refereed scientific journals.

The student must prepare a written dissertation based on his/her research work. The format of the dissertation must comply with the regulations contained in the *Guide to the Preparation of Theses and Dissertations*. After the dissertation has been approved by the SAC, a final oral defense is scheduled during which the candidate's understanding of the completed research project and knowledge of the major discipline are evaluated.

Course Descriptions

PHA 801. Introduction to the Pharmaceutical Sciences (3 hours)

This is a course designed to acquaint the student with the career options available to them with a degree in the area of pharmacy (PhD, PharmD or both). The student will be introduced to techniques in teaching, grant writing, scientific integrity/bioethics, developing a CV and cover letter, and interviewing.

PHA 803. Research Techniques I (3 hours)

This course is designed to provide the student a background in modern analytical chemistry and instrumental methods of analysis with applications to the pharmaceutical sciences.

PHA 804. Research Techniques II (3 hours)

A course designed to introduce the student to a variety of techniques used in the laboratory. An emphasis will be placed on animal use and care, as well as biochemical and molecular theory and techniques.

PHA 805. Isotope Tracer Techniques (3 hours)

A lecture/laboratory course designed to acquaint the student with the theoretical foundations and experimental techniques needed for the proper use of isotopic tracers in scientific research. Emphasis will be given to the use of radioactive tracers and their applications to pharmaceutical and biomedical research.

PHA 807. Pharmaceutical Biotechnology (3 hours)

The course is designed to familiarize the student with current technology. Emphasis will be given to methods involving genetic manipulations and immunologic tools. In addition, the course will include a thorough review of the most current agents (both those approved and those undergoing testing) including a discussion of how they function and how they are produced.

PHA 808. Quantitative Aspects of Drug Action I (3 hours)

A didactic course that examines the area of pharmacokinetics from both qualitative and quantitative perspectives. Emphasis is placed on quantitative relationships that interrelate pharmacokinetics to the disciplines of anatomy and physiology.

PHA 809. Quantitative Aspects of Drug Action II (3 hours)

A didactic course that examines the area of pharmacodynamics from both qualitative and quantitative perspectives. Emphasis is placed on receptor mediated systems, and on methods used to classify these systems and to describe their behavior in quantitative terms.

PHA 813. Advanced Medicinal Chemistry (3 hours)

Prerequisites: calculus and physical chemistry.

A theoretical treatment of structure activity relationships and approaches to drug design, enzymology, drug metabolism and chemical mechanisms of drug action.

PHA 833. Advanced Pharmacokinetics (3 hours)

Prerequisites: calculus and computer skills.

A course designed to provide the student with the advanced knowledge and skills necessary for problem solving techniques related to the relationship between plasma concentration and effect and clearance concepts as it relates to drug therapy.

PHA 835. Advanced Physical Pharmacy I (3 hours)

A course designed to study advanced physical concepts and methods as they apply to pharmaceutical systems and problems. Emphasis will be on chemical kinetics, acid/base equilibria and solubility.

PHA 836. Advanced Physical Pharmacy II (3 hours)

A course designed to study advanced physical concepts and methods as they apply to pharmaceutical systems and problems. Emphasis will be on diffusion, dissolution, interfacial phenomena and flow properties.

PHA 837. Advanced Biopharmaceutics (3 hours)

A course to provide advanced study of the relationship between physiochemical properties of a drug in a dosage form and the pharmacologic, toxicologic or clinical response observed. Emphasis will be placed on design and evaluation of bioavailability studies.

PHA 839. Drug Delivery Systems (3 hours)

Prerequisite: Advanced Physical Pharmacy II (836).

A course designed to study the preformulation, formulation details/limitations of various delivery systems.

PHA 849. Special Topics in Pharmaceutics (1-5 Hours)

A course to provide an in-depth coverage of a variety of current topics in the area of pharmaceutics, with each course dealing with only one or two major topics.

PHA 869. Special Topics in Pharmacodynamics (1-5 Hours)

A course to provide an in-depth coverage of a variety of current topics in the area of pharmacology/pharmacodynamics, with each course dealing with only one or two major topics.

PHA 897. Graduate Seminar (1 Hour)

Weekly to bi-weekly presentation and discussion of research topics. Students are expected to present a minimum of one seminar annually while in residence. A minimum of 3 seminars by each doctoral student are required before graduation. The course is taught on a satisfactory/unsatisfactory grade basis.

PHA 899. Doctoral Research (1-12 Hours)

Research for doctoral students.

The course is taught on a satisfactory/unsatisfactory grade basis.